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CILIARY ACTION AND FATIGUE*

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The purpose of this paper is to briefly summarize the salient points concerning the structure, innervation and action of the two types of muscle tissue found in connection with the ocular apparatus. There are several very interesting aspects to the study of the action processes of smooth and striated muscle, and their nerve control, which bear directly on our theories of eye strain and asthenopia. These problems will be presented here. No definite conclusion can be drawn, but it may prove an instigator of a little profound cogitation along these lines.

I am going to reiterate what has been said in many previous writings. The optometrist must be conversant with much of the material found in physiology, anatomy, physics, psychology and in particular—neurology, in order to better understand the phenomena with which he is coming in contact on many of his cases. It is the writer's purpose to advance some of the facts and hypotheses of this nature.

The study will be made in the following five parts: (1) Striated Muscle, (2) Smooth Muscle, (3) Involuntary Nervous System, (4) Ciliary and Iris Control, and, (5) A Consideration of the Cause of Asthenopia in Ametropia in Conclusion.

Striated Muscle

Structure and Histology. Striated, voluntary, or skeletal muscle (of which the extrinsic ocular muscles are formed) is composed of striated muscle tissue, supported by connective tissue and supplied with blood vessels and nerves. The connective tissue surrounding each muscle sends thin membranes between the fasciculi or bundles of the muscle, also enveloping the entire muscle.

The muscle tissue is composed of single cells, which, in the adult form, contain several nuclei. The muscle fibers are from one to thirty-five millimeters in length.

Each muscle fiber consists of:

1. Muscle plasma, enclosed in the—
2. Sarcolemma, a fine membrane.

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The muscle plasma of each fiber is made up of muscle fibrils surrounded by sarcoplasm. The fibrils appear to be merely more dense in nature than the surrounding plasm.

Each muscle fiber has cross striations, due, it is thought, to differences in consistency or chemical composition of the substance. Connected with each muscle fiber are one or more nerve fibers. The points of contact of the end-organs of the nerve fibers are in the form of oval expansions of the axis cylinder of the nerve—forming the motor end-plate which contains many nuclei. These terminals lie just under the sarcolemma. These are motor in nature. There are other nerve endings of a sensory nature and are more numerous near the tendons. Similar bodies, known as "Golgi's tendon organs" are found in the tendons and are of the sensory type also.

It is to be remembered that, in form, these striated muscles (recti and obliques) surrounding the eye are composed of a central thickened part, or belly and a tendon at either end, one of which is the *origin*, or attachment of least motility, and the other as an *insertion*, or attachment at the point of greatest motility. This classification while not always accurate in the other muscles of the body will suffice in regard to the recti and oblique muscles whose function is the rotation of the eyeball.

The above facts concerning striated, skeletal, or voluntary muscle are to be kept in mind as we proceed. It will be seen that the two types of muscle tissue are practically opposite in every consideration that we shall make. Also, keep in mind that in function, skeletal muscle executes rapid and vigorous contractions, liberates energy on contraction, and needs stimulus to contraction, but none for relaxation, as that process is believed to be a definite chemical action—a definite process.

Keep the thought in mind that *striated muscle needs a stimulus for* contraction only. It may be well at this point to consider briefly the processes of contraction and relaxation of striated muscle.

Contraction. The course of events in this process is determined by the neural impulse. This stimulus must be sufficient to pass the threshold or there will be no contraction of the muscle. With weak stimuli, just above the threshold, there will be a weak response, due to the fact that all the individual muscle fibers have not yet been stimulated. The fibers that are contracting are doing so at their maximal power. As the neural stimulus increases, more and more fibers are brought into action and the muscle reaches the *maximal contraction* of which it is capable. The study of the motor response determination and the amplification possibilities from a neurological standpoint are intensely interesting. The intensity of the original stimulus of course is an important factor in the strength of the response.

Following the stimulus, there is a brief latent period during which time changes are taking place in the muscle tissue. In this period lactic acid is being formed. At present it is believed that the acid is formed during the contraction and that its formation is the means whereby the

energy is released. The substance from which it is formed is believed to be glucose or a derivative.

At this point the lactic acid reacts with sodium bicarbonate to form sodium lactate which is a neutral salt. The following processes can occur at this time.

Relaxation. This is accomplished through the removal of lactic acid. It is an interesting fact that in fresh muscles the relaxation process is as rapid as the contraction. As the muscle becomes fatigued, however, relaxation slows down considerably. The end-products of the contraction process must be removed if the muscle is to remain efficient. (This is in accordance with the law in chemistry which states that the products of a chemical reaction must be removed if the reaction is to continue.) Therefore, the lactates must be removed in some manner. There are several possibilities, but the accepted explanation is as follows. A small amount of fuel is oxidized. This action makes energy available which is utilized in converting the lactates into glucose again.

The reader is urged to delve still deeper into this subject if he has not already done so. The material presented here is indeed sketchy, but will serve, it is hoped, as additional evidence in support of the problem of this paper. The various processes of smooth and striated muscle must be compared in order to have a full picture of the problem.

The recti and oblique muscles of the eye are composed of this kind of muscular tissue, thereby needing only single nerve control for the purpose of inciting contraction. Relaxation normally follows in the rested muscle. A stimulus to relaxation is unnecessary, it being, as we have said before, a very definite chemical process.

Smooth Muscle

Structure and Histology. Smooth muscle is vastly different from striated muscle in form, structure, and action. These muscles have no tendons, no definite origins or insertions. There are no cross striations. These cells are elongated or spindle shaped and are bound with a cementing material. They average about 1/24th of a millimeter in length, are flattened in one plane, and contain one nucleus. There is a thin enveloping membrane.

Physiology. Smooth muscle is less powerful than striated muscle. It makes slower movements. The cells slide past each other in their action—a differentiating feature which is not present in striated muscle. It is capable of instigating spontaneous contractions. *It can remain contracted for long periods without fatigue,* a fact which is all important, and which will be utilized later on. Energy is expended *only* when the muscles change their length. Also, and here is another important fact—*it needs two sets of nerve fibers to activate it,* these fibers to be antagonistic in stimulation.

Smooth muscle, then, needs *dual* nerve control, while striated muscle needs stimulus to contraction only. Smooth muscle needs a definite stimulus for relaxation as well. This type of muscle, then, will

not fatigue as rapidly as the striated type because its action is much slower, and less vigorous.

Involuntary Nervous System

For the sake of clarity the writer is going to add a few of the salient points and considerations of the involuntary nervous system. The reader is cautioned that there is much diversity of opinion among authorities concerning adequate nomenclature on this subject. This system which has to do with the involuntary function of the organs and glands of the body is named by some the sympathetic, by others the autonomic, by others the involuntary, and by still others the vegetative nervous system. They are to be taken as synonymous. There is confusion as to the two sub-divisions as well. In this paper, they will be considered as sympathetic and para-sympathetic. Explanations follow. It will be seen that these divisions are further sub-divided.

Para-Sympathetic System. Formed by the cranial and sacral portions.

Sympathetic System. Formed by the thoracic and lumbar portions.

Early in the development of the embryo groups of cells migrate outwards from the neural tube, and form the great sympathetic chains which reach from the head to the coccyx. The groups of cells form the ganglia, which are connected by vertical strands of nerve fibers. They are situated on either side of the mid-line in front or ventral to the vertebral column. Many good texts on anatomy and neurology will furnish the reader with a more complete picture.

The following table will show in part the antagonistic action of these two systems.

	Sympathetic	Para-sympathetic
Heart	accelerated	slowed
Blood pressure	raised	lowered
Digestive System	inhibited	normal
Secretion	lessened	increased
Pupil of eye	dilated	contracted
Hair	erected	depressed

It can now be seen that the involuntary fibers of the III cranial, or oculomotor, nerve running to the ciliary ganglion are of a para-sympathetic nature because of the interpolation of that ganglion. Those nerves which originate in the thoraco-lumbar regions are sympathetic in character, therefore antagonistic in action to the para-sympathetic. Thus the sympathetic pre-ganglionic fibers to the superior cervical ganglion and the post-ganglionic fibers as shown in the diagram may be the ones which have not as yet been found by investigators in connection with the ciliary fibers. This is the most logical source of sympathetic control which must be sent to the dilator of the ciliary in consideration of its structure and function. It is known that the same ganglion sends post-ganglionic fibers through the internal carotid nerve—then to the internal carotid plexus, to the naso-ciliary which is a branch of the ophthalmic division of the Trigeminus. From the naso-ciliary branch

the *long ciliary nerves* which carry sympathetic fibers to the dilator of the iris. Investigators have not found similar fibers to the dilator of the ciliary, but I shall state again, they must be present.

Not only in regard to the eye, but the entire body, from heart action to digestion, these two branches of the involuntary nervous system must balance. There is disorder in all other cases. There is some difference in dominance in the recumbent and erect positions.

The Ciliary and Iris

According to prominent histologists, these muscles are composed of smooth, unstriated, or involuntary muscle tissue. As true tissue of this type, the facts concerning its action may alter our conceptions of eye-strain considerably. We do not infer that the condition is non-existent, but it does appear as though it may be in some other form than we have conceded it to be for many years.

In accordance with known facts about smooth muscle, then, the ciliary muscle should be able to remain in a state of contraction indefinitely without fatigue, as there is an expenditure of energy only when the muscle changes its length, in other words, when focussing for different distances. According to this hypothesis, then, the ciliary muscle can overcome large amounts of hyperopia without actual fatigue to that muscle. It should be able to focus on a near point indefinitely also, without fatigue. I would not be a bit surprised if this is exactly the condition. We must look elsewhere for the source of our fatigue, and pain interpreted as asthenopia.

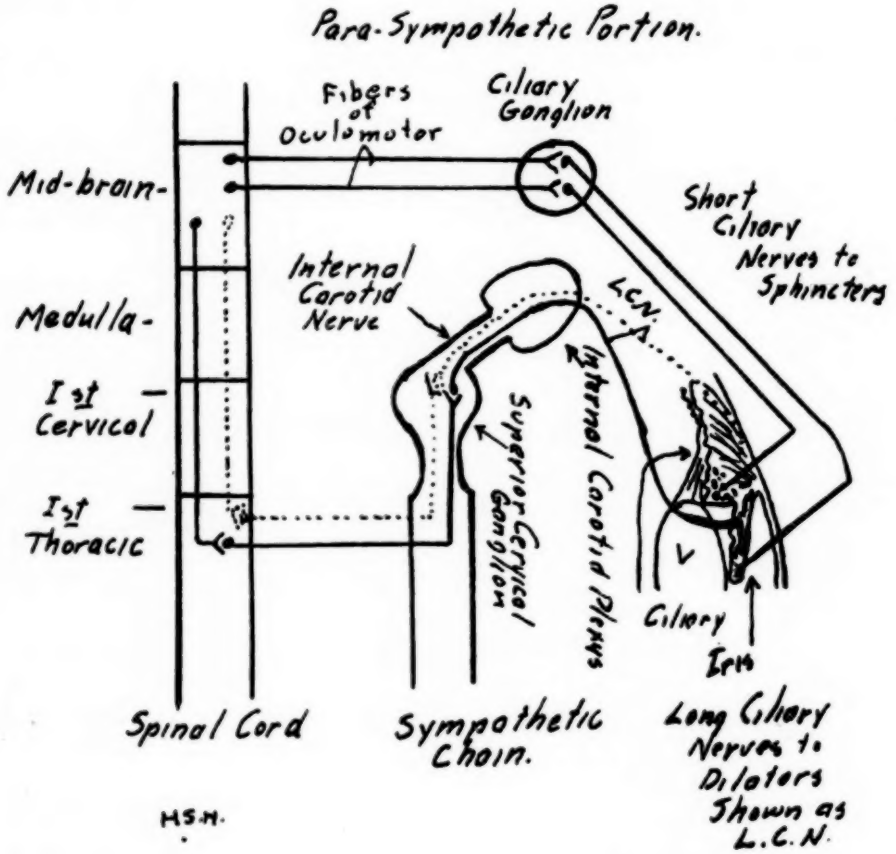
Let us look to the neural control of the ciliary muscle. Let us compare it with that of the iris as well as this latter is of interest in this connection because of its likeness and synergy of action with the ciliary.

The nerve supply to the ciliary sphincter muscle is composed of post-ganglionic fibers from the ciliary ganglion, where synapses are made with pre-ganglionic fibers in the III cranial or oculomotor nerve whose cell bodies lie in the mid-brain. The fibers are of an involuntary nature and are a part of the para-sympathetic system. The fibers from the ciliary ganglion to the distribution are known as the *short ciliary nerves*, innervating the sphincter of the ciliary.

I understand that histologists and neurologists are having a difficult time to find connections in the dilator of the ciliary with the sympathetic system. We do know, however, that the ciliary, being smooth muscle, must have dual nerve control. The fact that sympathetic fibers and connections have not as yet been found does not preclude the possibilities of their presence. Such confirmatory work is, of course, very difficult. For the sake of our argument we will accept the presence of both types of neural control in spite of the fact that only one source of control is known. The next question arising is this. If the para-sympathetic control of the ciliary is by way of the III cranial nerve and ciliary ganglion, which is identical to the control of the iris, where would we expect to find the source of the sympathetic control? We may find a

hint in the innervational sources of the iris which will now be considered briefly.

Like the ciliary the iris is composed of smooth muscle. There seems to be some difference of opinion as to whether or not the dilator fibers are muscular, purely elastic, or a combination of both. The former and latter theories are most widely held, I believe. Investigators have found that the circular fibers are controlled by the para-sympathetic fibers of a post-ganglionic nature arising in the ciliary ganglion, there synapsing with preganglionic fibers of the III cranial nerve. They are (the post-ganglionic fibers) known as the *short ciliary nerves.* As true smooth muscle tissue it has antagonistic nerve control via the superior cervical ganglion. This is of a sympathetic nature. (See diagram.)



SCHEMATIC DIAGRAM OF NEURAL CONTROL OF IRIS AND CILIARY.

The sympathetic picture is more complicated than the other. From cells in the mid-brain or mesencephalon, fibers proceed downward to the region of the upper thoracic nerves where synapses are made with cells in the ventral columns whose fibers of a pre-ganglionic nature proceed to the great sympathetic chains. They enter the chains and turn upward to the superior cervical ganglion. Here synapses are made with post-ganglionic fibers which appear to run through the internal carotid nerve, through the internal carotid plexus to the ophthalmic division of the V cranial or trigeminus nerve. The fibers are passed into the naso-ciliary, thence into the *long ciliary nerves* which proceed to the dilator of the iris.

If our hypothesis is true that the ciliary dilator fibers are innervated by the sympathetic system, and because the para-sympathetic control of the sphincters of both iris and ciliary are from the same source, we would believe that the above pattern given in regard to sympathetic innervation to the dilator of the iris would hold true for the dilator of the ciliary.

One of the points to note is this. Innervation of both branches of the involuntary nervous system derive their original stimulus from the cells in the mid-brain. The para-sympathetic proceeds more or less directly, while the sympathetic travels by a very devious route to its distribution.

In noting the actions of the ciliary and iris, one is impressed by the similarity—the synergic action—the reflex action of one to the other. This basic fact underlies the hypothesis as advanced in this paper. It is a most interesting picture, and one which I am sure will give a better understanding of some of our ocular phenomena.

Conclusion

Due to the conceptions of anatomy, physiology, and neurology which have been advanced here, and to the possibilities of the channel given for sympethetic innervation to the ciliary muscle, the writer believes that there may be a very different source of asthenopia than has been universally conceded in the past. In other words ciliary fatigue is improbable in this light. A study of smooth muscle makes this old theory untenable when correlated with proper physiological and neurological facts as we have done here.

The case with all but one function in proper balance, and tone cannot expect visual efficiency devoid of excessive fatigue and consequently asthenopia. Hypotonic convergence muscles, which are generally conceded to be the medial recti with the plane of vision agreeing with the primary position, and the addition of the superior obliques, and inferior recti when the gaze is depressed, will not allow comfortable close application. The ocular situation must be investigated on every case with more meticulous care, precision, and completeness than ever before. Rarely can an accurate diagnosis be made on as few findings as the vast majority of men make.

If ciliary fatigue is improbable as we have shown, there must be other sources of the discomfort. The most probable possibilities follow.

Convergence fatigue the Factor. It is entirely possible that due to the reflex and synergic hook-up between accommodation and convergence, the striated muscle of convergence muscles may be the source of the trouble. The extrinsic ocular muscles being striated in type are much more easily fatigued than is smooth muscle. If the case is one of hyperopia, the continuous flow to the convergence, and the upset equilibrium between the innervation to the two prime ocular functions may be the source of the asthenopia.

Strain on Layers of the Globe the Factor. It is also possible that the tension produced by continuous contraction of the sphincter of the ciliary in accommodation may exert a strain on the layers of the globe which would in due time produce a sensation of pain and fatigue, because of the richness of nerve endings of a sensory nature derived from the great sensory or Trigeminus nerve with which this region is well supplied.

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THE PHYSIO-PSYCHOLOGICAL APPROACH TO SQUINT*

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We refer you to the work presented at the last Academy meeting in Omaha, entitled, "The Correction of Squint on the Dominant Side," the same being a somewhat vague groping on the part of this Fellow in an effort to fathom the subject of squint.

Obviously the work of 1930 was philosophical, primarily. If this paper presented today shall reveal any definite accomplishment, it will be because of the philosophy used a year to three years ago. All knowledge is founded on philosophy; the trial and error methods of science follow out the dictates of man's philosophy.

The dearth of literature on the subject presented is, and has been, discomforting. As a result, all material presented herewith, in so far as Optometry is concerned, is original, to the best of my knowledge.

At the start, I particularly want it understood that the work thus far has been of an experimental nature. All material presented is the result of experimental work in psychology, relative to Optometry. We make no positive conclusions and we hold no positive prognosis in psycho-therapy as related to Optometry. I merely present to this Academy certain experimental work performed and relate the results of such work. Further than this, I am presenting nothing and am most certainly not presenting a new technic for optometric correction of squint. The work presented is only of the most elementary nature and is presented in a non-technical manner. To resort to technical psychological terminology would make the material presented less understandable and therefore less interesting to our group. I judge the group solely as laymen in the psychological field, even indeed as I am. This paper, then, presents only a start in the work of squint and its psychological aspects.

Having had the usual college course in Psychology L, the same being the minor of the psychology courses, the speaker recognized a possible connection between his work and that of the psychologist. In

*An abridgement of the material presented before the American Academy of Optometry at Philadelphia, December 6, 1931.

order to better acquaint myself with the psychologist's work, I enrolled in the Abnormal Psychology class at Syracuse University, under Professor Wesley R. Wells. It has been my pleasure to have had the hearty co-operation of Professor Wells in at least two of the cases presented. I intend to further pursue the University work in the spring semester of 1932.

Let us start with a few lay thoughts as to definition of the subject of psychology. We will name three fields of human study in order to better fix in mind the field with which we are to deal. Anatomy is the field in which structure of the body is studied. Physiology is the field which treats of the functions of the body, while psychology is the field which treats of why the body functions as it does. In a broad sense, we might define psychology as the study of common sense, though it is literally more complex than that. If we were to consider psychology as the study of common sense, we would very often find persons to whom no psychology could be attached, there being a void of common sense. But seriously, the study of psychology is strictly the study of the mind and its phases.

Psychology is an established science, though it is not a finished one. The probability of its ever entering the class of finished science is rather remote, in my judgment. There are various types of psychology being taught in the universities today. You are undoubtedly acquainted with the more common classifications such as business psych, sales psych, behaviorism, child psych, etc., etc. Our work has fallen into the particular field of abnormal psychology.

Do not be alarmed by the term "abnormal psych." You may not realize it but we all present here today would fall in the classification of abnormal. This is not an insult, but rather a compliment, for the real meaning of abnormal is unusual. Do you question the fact that you are unusual? Is it the usual thing for optometrists to close their offices and travel hundreds of miles to attend a three or four day session of the Academy at their own expense and at a distinct loss of income through absenting themselves from their offices? This is abnormal in that it is unusual. We are, therefore, all of us, unusual or abnormal.

It is not difficult now to see why the subject of squint would fall in the classification of abnormal psychology. We all recognize squint as abnormal or unusual, a deviation from the usual. It is not usual for folks to have squint. It is definitely unusual—abnormal.

The subject of abnormal psychology is usually grouped into two phases, that of clinical and experimental. The clinical study is the study of abnormal psychology of abnormal folks, and from its name, one gathers that the study is carried on mostly in clinics and hospitals that are set up for the purpose. However, strictly speaking, a squint is an abnormal condition and in the treatment thereof, would be classed as a clinical case. We refer you to the modern works on abnormal psychology for further information on the classification of clinical work

as well as nomenclature of purely scientific origin. "Readings in Abnormal Psychology," edited by Dr. W. S. Taylor, Professor of Psychology in Smith College, chapter 2 of Taylor's work will give you a comprehensive idea of the nature of the work. (D. Appleton and Co., N. Y., 1929.)

Our work has been done mostly among university students, and the only abnormality that was evident in these students was the squint of which they were possessed.

Referring to our definition of psychology which says that the subject is a study of the mind and its phases, we need now to obtain a workable basis upon which we can begin to understand the material that is presented. In this connection we refer you to Morton Prince's "The Unconscious" (Macmillan, 1921). For the purpose of this presentation, we are taking liberties with the accepted scientific status of the subject in order to more surely impress the subject. Though this is not accepted in psychological circles, the popular conception of the subject admits of considering all normal persons as being possessed of apparently two mind entities. Both of these entities are so closely related and so indefinitely separated as to make the subject debatable. But for our purpose, let us consider the existence of a conscious and subconscious mind in every normal individual. Reference is made to Dr. Taylor's work, "Reading in Abnormal Psychology," pages 474-491, inclusive. This reading will give the scientific conceptions that are currently used in the explanation of the subconsciousness and its activities. Suffice it to say at this time that briefly, the scientific explanation is this: "The more common (and probably more satisfactory) use of the term subconscious is to denote nervous activity and experiences in nerve centers which are not functionally united with the general system of cortical activity and personal experience." This is a quotation, Taylor's compilation, page 481.

But this scientific explanation leaves us without a conception of the possibilities to which this subconscious activity could be put to our use in the correction of squint. I will now digress from the purely scientific matter to a more popular conception of the subject. It is to be distinctly understood that Professor Wells does not uphold me in this conception nor does he subscribe to it. But for the purpose of making the subject more understandable without great effort being expended in the psychological field (and for which I am not qualified) we will think of the conscious mind as being the portion of the mind that has to do with our orderly thinking processes and our awareness of our being. We might consider the subconscious mind as being the storehouse of forgotten experiences of the conscious mind. We might also give this subconscious mind certain other attributes such as being the origin of the dream state, and also being the portion of mental activity that motivates unconscious acts that are not in association with the consciousness.

The conscious mind normally presents a unity that constitutes the consciousness of an individual. Consciousness is defined as a state of

being in which an individual knows or is aware of his existence and his surroundings and has also an awareness of his relationship to his surroundings. A lack of this awareness, or a partial lack thereof, indicates unconsciousness or partial unconsciousness according to the degree in which the awareness is lacking.

In the normal individual we have a unity of consciousness in which all conscious faculties are normally acute and normally active. A breaking up of this unity of consciousness is called dissociation. This term will be used considerably herein and must be kept in mind. Disassociation, being the breaking up of the unity of consciousness, is the result of "the division of the mind into independent fragments, which are not co-ordinated together to attain some common end." I have quoted from "The Psychology of Insanity" by Dr. Bernard Hart, University College Hospital Medical School, London, Eng. (Cambridge University Press, London, Eng., 1929). I particularly commend this book and its chapter on "Dissociation" as being a classic on the subject.

When the consciousness is broken up and unity is no longer existent in any particular case, we may say that a portion of the consciousness has been "split off" or uncoupled from the whole consciousness. A "splitting off" of consciousness is properly known as dissociation of the consciousness. This dissociation may occur in many different ways: Acute fevers, traumatism, drugs and certain mental diseases are common dissociative factors. We may also create dissociation through artificial processes. Among the latter form of dissociation, hypnotism and psycho-analysis are conspicuous among others. In otherwords, we may specifically cause the splitting-off of a portion of the consciousness in such a manner that this split off portion no longer remains in touch with, or under control of, the conscious mind. For further study of dissociation I refer you to the standard work of Pierre Janet, "Major Symptoms of Hysteria" (Macmillan, 1920). This is a splendid reference book for the field that we are experimenting in. Anyone attempting to study this field cannot be without this work as it is basic in its scope and very important in any discussion of the subject.

But to get back to squint. Squints of the type due to frights and enteric disturbances of childhood are, in my opinion, purely evidence of dissociation. Specifically, squints occurring in children of one to three years of age are the types we will speak of now.

The fright of childhood overwhelms the reason of the child and a psychic disturbance is set up which results, accidentally, in the dissociation of the faculty of binocular use of the eyes. Tantrums in children are psychic disturbances, in that the behavior of the child has gotten out of his conscious mind's control. In the midst of a tantrum, the child is helpless to cease his carrying-on. The spell lasts until exhaustion takes place, or until a violent outside influence breaks in on the dissociation of the consciousness. The child is literally swept back to reason or becomes exhausted through the enormous outpouring of uncontrolled

nervous energy and the tantrum therefore stops because of a stopping of the flow of nervous energy. If left to this latter stage, before there is a cessation of uncontrolled nervous energy, there is apt to occur an overflow that overwhelms the assocociated binocular function.

If this happens, Dr. Woll's outline of the behavior of muscle gives us a very excellent clue as to why squint should occur. Dr. Woll's work shows that a muscle tends to hold the position attained by the last nerve innervation received by it. In an overflow of uncontrolled nervous energy, the internal rectus is overwhelmed and sharply reacts to the overwhelming innervation received. By that action, the dissociation of convergence is definitely set up. The external rectus cannot react sufficiently to overcome the overabundance supplied to the internal, and the internal holds its position of flexation as per the last innervation received by it. Just why this should affect convergence is a mute question. We may philosophize that the function of convergence is a primary one in development at the age in which tantrums are most common, and because of this primary development, it may be the logical one to be affected because of its prime importance in the physiologic development of the child at that particular age. That is my phase of the understanding of the matter. It may not be the correct explanation, but at any event, there are plenty of records that show a child when punished, or in a fit of tantrums, gave way to a very marked and abnormal (in the sense of morbid) display of uncontrolled physical action and then dropped off to sleep. After awakening, a squint was discovered by the parents. We do not presume to say why this should be, nor do we know why the eyes should be particularly susceptible to this abnormal expenditure of uncontrolled nervous energy, unless it be due to the thought expressed above, relative to the physiologic development of convergence at the age at which the tantrum occurred. It is evident to a discerning individual that the eyes seem prone to be affected by these outbursts of temperament. After all, may it not be said that temperament is but an index of one's psychic constitution?

We may say that a tantrum in childhood and a show of temperament in adults is a form of dissociation. The unity of sane consciousness is broken up and the reaction is always problematic. Reason is forced to retire in favor of blind rage.

About three years ago, the speaker began thinking along these lines and finally was led to think that if squint was caused by a dissociated occurrence, it *might* be reasonable to assume that such squint *might* be cured by reversion to the state in which the squint occurred.

We again bring to your mind that we refer only to those types of squint in which there is reason to believe that a psyhic disturbance caused the squint. Latent hyperopia and in fact all uncorrected ammetropia squints are ruled out of this discussion. Obviously all organic lesions that would create paralysis of the externals is also eliminated. In such squints that are traceable to psychic disturbances, we are reason-

ably assured that such squint was the result of an accidental dissociated state. A reversion to the dissociated state would logically be indicated as a method of approaching the proper treatment of such a case. The speaker's philosophy indicated this line of reasoning to be correct. Upon this premise we undertook to delve more or less deeply into the possibilities offered in reversion to the dissociated state. This work was done under an eminently qualified psychologist, Dr. W. R. Wells of Syracuse University. This paper deals with the experiments of such work. We have only a very brief report to make, and the nature of some of the material prevents any positive statement being made as to the prognosis of such treatment or as to the general application that can be made of such treatment. I repeat: only the most abbreviated experimental process has been carried on. This has been due to a lack of time on the part of the professor and a lack of knowledge on my part. The former condition cannot very well be changed, and the latter can only be eradicated by time and study.

It is perfectly certain that I do not recommend this technic as a general optometric technic in the correction of squint. It is merely reported as experimental work in the line of proper understanding of, and *possible* correction of squint. We are very certain that the material now to be given is outside the present scope of optometrists who are generally without preparation in the field of abnormal psychology. It is the speaker's conviction that the field of psychology should be left to the psychologist. The question then arises as to just why I am presenting the material before the American Academy of Optometry. The answer is obviously simple. By training and legal qualifications, the optometrist is pre-eminently in the field of squint. Our efforts heretofore have been along the line of physiology and anatomy. We have pondered upon the functioning of the eyes in binocularization as is exemplified in squint, but aside from the squints of ammetropia, our physiological approach on squint has not given us the key to many of our squint cases. Anatomically, squint is usually so easily accounted for that little is left to experiment with. Prism correction for anatomical muscular defects has been resorted to for so long a period and with so much success, that our problem seems not to lie in this direction at all.

The squints of infancy following such frightful disturbances as are sometimes experienced in childhood, are sure to mark such children as are afflicted, with a permanent squint. These are not corrected by ammetropic corrections and if they are ever corrected by optometric instrumentation and technic, it is because of the psychology of the instrumentation and not the efficacy of such instrumentation along physiological lines.

This phase of the subject has been explained in my paper presented at our last session held in Omaha. Your own experience matched with the experience of others definitely shows something to be accounted for in past technic on these particular squints. Your technic may be followed to the letter in a second squint of identical classification but

because of an unknown factor entering, the same results are never obtained. The unknown factor may be resolved into "personality," "confidence on the part of the operator," or any number of other intangible factors. I submit that all these "unknown factors" may be summed up in the word "psychology." The patient is "cured" of squint in direct ratio as the technic impresses its logic and purpose, and thereby its effectiveness, in the mind of the patient. You will please take note that I said the "technic impresses." It will be demonstrated that confidence on the part of the optometrist in his technic is a great factor in correction of any squint.

I have not had the pleasure of watching Arneson and his work in this field. I have, however, had the opportunity of studying his technic and I have talked with several men who have been with Arneson for instruction and as students of his technic. Invariably, by all the men whom I have questioned, I am told that they themselves, practicing as nearly identical technic, have arrived at exactly nowhere in their efforts. Arneson is possessed of unusual native intuition and his reaction to his patient's needs is phenomenal. Needless to say that his patients's reaction to his technic is phenomenal, equally so or possibly greater because of the mass psychology involved in his "wholesale," so to speak, manner of treatment. The Arneson technic is not at all understood by Arneson and he himself has gone on record as not being able to account for the success. He very candidly admits that he does not know the solution of his ability to get results. To attempt rational explanation outside the field of psychology seems, to this speaker, irrational.

We now attempt to set forth as simply as possible, the meaning of the term dissociation as will be used considerably from this point onward. It must be understood that whatever liberty is taken with the scientific facts involved, is taken merely because it is necessary to present the topic of dissociation in an understandable manner. The technical explanation was a lot of meaningless words to me prior to the time that much study was given it, and if I assume you to be in the same class with me, it will be only that I desire to take nothing for granted. Any inference other than this one, is not to be taken seriously.

Let us attempt a concrete explanation of dissociation. Let us suppose that one of you should leave the room and in so doing, accidentally stumble over the threshold and fall, striking your head on the marble floor. If the blow was sufficiently powerful, you would lose consciousness. It would be said that you were unconscious. From the popular, not technical, definition previously cited, we would know that your conscious mind was not functioning. It would be said to have suspended operations. While this state is unconscious, we are not justified in calling it a complete cessation of brain activity. The vital functions of the body would still carry on, and had no one known of the fall, it would be difficult to tell whether you were merely asleep or "knocked out." The outward appearance, barring a possible unnoticed abrasion on the head, would indicate sleep and only when we attempted to

awaken you would we find the condition entirely aside from sleep. A complete dissociation will have taken place. This form may be classed as traumatic dissociation.

Now supposing one of you should so tire from listening to this paper that you permitted yourself to yield to the inclination to drop your attention, and take your mind off what I am saying and to further bar all other disturbing factors in the room and to shut out all exogenous stimulations such as light, sound and touch, to become in other words, oblivious of your immediate surroundings, narrow your field of consciousness to a point where consciousness no longer is extant, we might find you as fully relaxed as the supposed case of falling, and the dissociation might be proved to be as complete. However, when an attempt is made to arouse you, you would readily come back to consciousness and almost immediately be in the same or better physiologic and psychologic state as before you yielded to the inclination to permit me to talk without listening to me or without directing your attention to something else. You most certainly admit that you fell asleep and that you were most certainly out of touch with your surroundings while asleep. This is normal dissociation, experienced by everyone, on every occasion when sleep is had.

Now let us go over to one of the insane hospitals and consider for only a minute a possible case that we might see. Here is a man that looks as though he were a bank clerk. He is bright and cheerful, smiling and affable. He will carry on a very intelligent conversation on almost any topic that you may suggest. But in the matter of scientific construction of bridges, let us say, we are conversing upon the wonders of the new Washington bridge at New York and all of a sudden when we have reached the matter of welding and riveting work done on the bridge, he will begin to rave about how he invented this and that process and how he is being kept in the insane hospital in order that someone might beat him out of his rightful participation in the money to accrue from the building of this bridge. We term this a dissociation as surely as we term the above cases that of dissociation. It is obvious that the types are different, though a close scrutiny will pick a definite line upon which the three cases are related.

Dissociation is a mental disorganization, caused by many different things and may also be artificially created. We have shown in the above three illustrations how dissociation is sometimes created by injury, or naturally by sleep, or unhappily through some process of wrong thinking, or mayhap through pathology. We have yet to tell of the manner in which dissociation can be brought about by artificial means. In a sense, the last cited case above was one in which the dissociation was artificially produced. Wrong habits of thinking and improper thoughts are dissociative in themselves.

But let us take a more common illustration. Here is a man who attended a party with the thought in mind of having a pleasant evening.

The host served some drinks of alcoholic content. This particular chap began drinking, and before anyone was aware of anything being wrong, this chap began laughing at the most trivial occurrence at the party. One thing lead to another in rather rapid succession until before many minutes had elapsed, he began talking incoherently about the most unheard of subjects. He was drunk, and so we have an evidence of dissociation artificially produced through the unwise use of alcohol. Narcotics and alcohol may be classed together as drugs and these have a marked tendency to produce dissociation.

Sleep is another form of dissociation and its process is well known to all of us. When we stop to consider sleep we are aware of three things usually taking place before sleep is upon us. First, we have a narrowing of our field of consciousness. In other words, we do not normally go to sleep with our minds concentrated on something of importance. We are certain that we are fairly well relaxed and thirdly we are not planning an active piece of work that would require mental activity. Our minds are either completely placid or what mental activity that is present is of a repeating nature. Repetition becomes monotonous and soon dwindles off into nothingness. Our bodies are relaxed and our field of awareness is considerably circumscribed. When this field of awareness narrows down to nothing, we are then resigned to oblivion through sleep. This oblivion is, of course, of the duration of the sleep.

We are going to spend a little time in discussing sleep, for the artificial dissociated state which we have used in the correction of the type of squint under discussion, has much in common with sleep, though it is not exactly sleep and never should be so considered. Sleep is one form of dissociation and as such, should not be confused with the particular form which has been used in our work. The analogy is close. In sleep, our conscious mind is inoperative. Our normal senses are inactive, for the entrance of these senses is effectively shut out of the conscious mind. But to say that there is no action whatsoever in the brain during sleep, would obviously be an error. While our conscious mind is quiet, our subconscious mind is anything but quiet. Dreams register in our conscious minds and awaken us, when the subconscious activity is too great. The subconscious activity is ordinarily not sufficiently strong to break through, but any time that we are able to recall a dream, we may be sure that such dream has been impressive enough to break through the conscious mind's sentinel and register its presence.

The specific form of dissociation that is used in the experiments performed is that of hypnosis. The technical definition of hypnosis is not material to us in this paper. For such technical reading as will be helpful in a better understanding of the subject I refer you to J. Milne Bramwell's "Hypnotism, Its History, Practice and Theory" (Lippincott, 3rd Ed., 1907); Wm. McDougall's article on "Hypnosis," (Ency. Brit., 11th Ed.); Wesley R. Wells' "Experiments in Waking Hypnosis for Instructional Purposes (Journ. Abn. Psych.

18:389-404, 1924).

Now as a matter of record, we present our first case, giving as much of the background as seems important in the development of the case.

We began the University class work in Abnormal Psych in February, 1931. We did not make known our ideas in regard to the application of abnormal psych in the practice of optometry. The professor had had one former student who was an optometrist and the contact did not react in favor of optometry or optometrist. We had to present modern optometry in its modern light as we went along in the course. Very strangely we happened to have a divergent squint case in our class. After two months' work in the class and after attaining average marks and showing an interest above the average of the class, we finally managed to have a talk with the professor and gave him our story, which was purely philosophical, based on very meager physiologic facts. The physiology of binocular balance is not fully completed, so we had to go slowly. The professor finally saw a possible connection between his work and ours and for a few days thought the matter over. It so happened that one of our good hypnotic subjects had a divergent squint of considerable amount. Having in mind a possible resort to this technic we approached the student whose name was Mr. B and who was a senior in the L. A. college. He was to graduate in music and had picked public school music as his future vocation. With this squint, he was certainly bound to be adversely affected in any of his future plans for his work. He consented to submit to the experiment after talking with the professor and myself. I made a refraction on April 27th, 1931, and found that he required this prescription:

O.D. — 1.00 D.S. ⌒ + .75 D.C. Axis 65
O.S. — 1.00 D.S. ⌒ + 1.00 D.C. Axis 105

V.A. in O.D. was 100% and V.A. in O.S. barely 10% with Rx. I prescribed a red filter over the right eye in an attempt to improve the left eye acuity. This was worn for four days without improvement in left V.A.

The case history was as follows: Divergence noticed when he was a very young child and no attention given it until he went to school. An oculist treated the eye for a year but did not correct the trouble. He was unable to fuse under test, the acuity of left eye being so low and no cutting down of the right eye V.A. would give us binocular fusion. He was sure that he never saw stereoscopically as other of his childhood friends had described as having seen. The left eye could be made to move but unless he was giving his full attention to such movement, it would cease very soon. In a test for handedness and eyedness he was unable to align the target and his hand and eye on the left side nor on the right. He did say that it was nearly in alignment with his left eye and left hand. He is right-handed,

but there is evidence of his doing some things left-handed and says that he thinks he was left-handed when a small child but that his mother forced him to use his right hand. He is now 22 years of age and wore a very heavy shell frame in order to hide the divergence of the left eye.

After reporting to Professor Wells that I thought this would be a good case and that it offered as much hope of success as any we could hope to find, he finally consented to come to my office with Mr. B to perform the dissociation and to use the psycho-therapy in experimental work on the left eye.

On May 1, 1931, we gathered at my office and had as witnesses, my father and Mr. B's lady friend, Miss S, who was impressed only a little with the whole matter.

I recognize and respect Dr. Wells' field and he recognizes and respects mine. We do therefore respect each other's endeavors.

The part that follows was, to me, and to all present for that matter, the most astounding half hour that could be imagined.

Bear in mind the case. A senior at Syracuse University, Mr. B, age 22, left eye divergent squint of as nearly 45 degrees as we were able to measure carefully. Left eye acuity 10% at best.

We seated Mr. B in the chair and Professor Wells induced the dissociation. After about six minutes the patient was in a very deep dissociated state and Professor Wells then told the patient that his left eye would improve in acuity, because he would from that moment on, make use of left eye. This of course had not been the case up to the time of the present work done on the gentleman. He had heretofore used the left eye but very little. Dr. Wells then had the man open his eyes while still in the dissociated state and we instructed him to read on chart No. 4 of the Genothalmic V.A. Cabinet. This was read perfectly with the exception of the bottom line on this chart. We rated him 50% minus 1. The right eye was absolutely occluded in this test. Professor Wells then had the patient close his eyes and more firmly impressed the idea of better visual acuity in the left eye and then checked for further work in the dissociated state.

Professor Wells now made the statement that hereafter the left eye would no longer deviate outward but would hold parallel with its mate and would work in proper unison with it. The patient was then directed to open his eyes, while still in the dissociated state, and the eyes were perfectly straight.

I cannot express the feeling that came over me. It seemed as though a load had been lifted off my mind, and yet it did seem a second later that I was merely realizing a dream that had come true. A fraction of a minute later, I assumed the "I told you so" attitude. This seemed wholly out of place for some reason or other and I immediately gave way to an expression of wonderment. Professor Wells told the

patient to again close his eyes and that he would remain in the dissociated state until told otherwise. Dr. Wells more firmly impressed the suggestion upon the patient's subconsciousness while in the dissociated state and then gradually brought the patient to his normal state. The eyes remained straight, his acuity in the left eye fell from 50% to 40% plus and he followed perfectly any arcs described with a pencil held 16 inches in front of his eyes.

I measured the possible deviation with the kratometer immediately after he was returned to the normal state, and found orthophoria for 6 meters and 3 esophoria for near. I was surprised at this finding and can only explain it philosophically.

We kept track of this man until graduation and the eyes were still straight and his acuity was not further measured because of a press of time at examination period and he could not come to the office. He reported that he sees very well with his left eye as of September 15th. His binocular balance is apparently normal, at least so in so far as the squint is concerned, but his phoria is now unknown to me. I tried to get this information, but the fellow feels now that he is cured and hasn't the time to devote to further experimentation.

The second case was one of a university student, convergent squint which was unsightly because of its great disfiguring quality. The deviation was more than 60 degrees. I could not measure its exact amount. The man was Mr. N. P., age 26, senior in Liberal Arts. Right-handed, left squint of great amount. Student in Dr. Wells' mental hygiene class and coincidentally a good subject for dissociative work. He came to the office for a refraction and was wearing O.D. — 1.00 D.S. V.A. 20/20; O.S. — 1.25 D.C. Axis 145 V.A. 20/140 —. Our refraction indicated O.D. + 1.00 D.S. V.A. 20/20; O.S. + 1.00 D.C. Axis 65 V.A. 20/80 +.

Immediately made up the lenses and the next morning at college, Dr. Wells called me out of class to ask me if I had used his technic on Mr. P. I said no, merely that I have given him a proper optometric examination and asked why. Dr. Wells explained, "But his eyes are straight." I looked, and so they were. The only thing that was done was the proper correction of his *hyperopia*. He was wearing a correction for *myopia*, prescribed by an oculist at home. That was to be our second case using the dissociation technic.

Our third case was that of a student 24 years of age, junior in L. A. College, with an alternating squint. By this time I had been fully convinced that we had found the panacea for all squints of the kind indicated. I am of the opinion that alternating squints are purely psychic and from that fact, to me, ought to be curable by the dissociation method. The two previous cases were squints and were very good subjects for this work, and this gave me an idea that all squint cases might be good subjects. This alternating squint of all other cases surely ought to be a good subject for dissociation. After three

attempts, Dr. Wells gave up the case as being one requiring from 5 to 100 or possibly 200 hours of training before dissociation could be had of sufficient dépth to make post suggestion effective. My little castle in the air fell down on my head and maybe you think that fall wasn't a sad one. I had built up high hopes of success in this case because of my philosophy on the subject. Here, if ever, was a perfect case for the use of dissociation. But to my chagrin, dissociation was not produced in the time allotted and Dr. Wells could spend no more time on this particular case. His opinion was that if sufficient time was devoted, say fifty or possibly a hundred hours, there seemed to be evidence to him that dissociation could be had. This would entail more expense than the patient could afford, and I did not think it up to me to provide the necessary means of further experimentation. This in view of the fact that if dissociation is had, it must be of a depth sufficient to enable us to use post-dissociation suggestion in order that our work be permanent in its nature.

Our next case was that of a shop man. He was 25 years of age, had a left squint and was left-handed. His acuity in the squinting eye was 40% with the correction and barely 20% without. His Rx was O.D. + 1.75 D.S. ⊃ + .50 D.C. Axis 90; O.S. + 1.75 D.S. ⊃ + 1.50 D.C. Axis 90.

There is no evidence of pathology in any of these cases. This subject reacted favorably to preliminary tests for susceptibility to dissociation but when tried, he too, failed to dissociate.

We were present at a student's home one evening when the student, as students sometimes do, got a real bright idea. This chap had also studied the abnormal psych course at the University and contrary to the advice of Dr. Wells engaged in dissociation experiments. He has become rather adept at the work, and to show his ability, offered to perform any experiment that I might suggest. His cousin, who lives with him, is a myope of two diopters and proved to be a good subject, the student having given him about three hours of training. I suggested a trial on visual acuity without glasses. The young man was dissociated and his glasses removed. I had brought along an old Snellen test card and B. & L. trial case. I neutralized the young man's glasses and found them to be minus 2.00 D. He was placed in the dissociated state and the card was placed 21 feet from his eyes. He was directed to read the chart backward, skipping every third letter, and starting at the second line from the bottom of the card. This chap read 20/20 perfectly and read four out of eight letters on the 20/15 line without glasses. His correction was approximately correct as far as I could judge from a cursory retinoscopic test. I am unable to explain this. Someone has said that the measure of V.A. was a matter of pure relativity. From this experiment, I must say that it evidently is.

And I am further of the opinion that vision is measured, not by

definite outward manifestation of ability to pick letters and figures at a given distance, but by the inward urge to see. It takes considerable thought to attempt an explanation of this idea. Suffice to say that everyday experience with myopes requires a modification of our understanding of visual acuity. The psychology of vision must be considered. An average myope when indoors fails utterly to make any kind of a showing in V.A. tests. But out-of-doors, these myopes show a surprising ability to see. We are unable to measure the urge to see, but it is perfectly obvious, especially in myopes that the acuity is measurable, not by Snellen standards, but by the desire or need on the part of the patient and his reaction thereto.

My conclusion is a summary rather than a conclusion. I have attempted to put the experiments in their true light and have tried to keep away from any sensationalism. There is nothing herein that cannot be demonstrated. I have purposely omitted much of the technic employed by Professor Wells. This technic does not concern optometry, but is purely that of the psychologist. I do not advise any optometrist to practice the psychological technic. I do advise this Academy to more thoroughly group squint cases, and to study the possibility of psychology aiding us in a better understanding of squints. To this end, I most cordially invite your valued assistance.

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THE MARVEL OF THE CHLOROPHYL GRANULES*

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A short time ago the world, or rather that part of it interested in educational matters, say the educational world, was astounded to read of the election of a young man of forty to become the head of Harvard University. This man is Prof. James B. Conant, primarily a chemist, but in a way also a biologist and a physicist. Perhaps the term, bio-chemist, would describe him best. Prof. Conant in the past year or so discovered the chemical structure of the chlorophyl molecules gaining international recognition for the achievement, and the award of the American Chemical Society.

What is chlorophyl, and in what way is it of interest to the optometrist? Briefly it is of interest to the optometrist because it illustrates phenomena of light and life, of utilization of light energy and adaptation to light variations in a manner instructive to the specialist interested in light, vision, and eye comfort. The optometrist is certainly interested in the triad of light, vision, and eye-comfort, and it is to him that the chlorophyl granules can tell an interesting story.

The word, chlorophyl, is the Greek for "green leaf." It refers to minute granules found in the protoplasm of certain cells in all green plants. It is closely allied to hemoglobin which is the red coloring matter of the red blood corpuscles of animals. The hemoglobin carries the life sustaining oxygen, but the work of the chlorophyl granules is even more wonderful. They form the corner stone of all animal life by providing and manufacturing food for the animals.

To be more specific. The digestive and assimilative system of the animal, be it the tiniest one-cell ameba or the giant elephant is so constituted that it can digest and assimilate only organic food stuffs. The only inorganic materials which the animal can consume and assimilate are table salt and water. All other nourishment must be of organic nature, be it plant food as in the herbivora, animal food in the carnivora, or both in the so-called mixed eaters.

Unfortunately for the animal world, animals cannot make organic food out of inorganic material. Here is where the plant world rules supreme. And here also is where the indispensability of the chlorophyl

*Submitted for publication June 20, 1933.

granules comes in. They have the unique power of absorbing sunlight and turning the light energy thus absorbed into chemical energy. This energy is used to compound water and carbon-dioxide into starch, the first stage in a further synthesis of the organic food stuffs of carbohydrates, fats and proteins. Out of the two simple inorganic substances, water and carbon-dioxide, the plant through the agency of the chlorophyl granules can create complex organic substances to feed the whole animal kingdom. The light energy is converted by the chlorophyl granules into bio-chemical energy. Whatever else Prof. Conant may do, as President of Harvard, his work with this substance alone will stamp his name amongst the great men of the century.

The light energy which is utilized by the chlorophyl granules in the plant for creative purposes is utilized by the visual organs of the animal for seeing purposes. And it is largely through the organ of sight that man has become master and lord of creation. Aided by the microscope, telescope and spectroscope man's eye can explore on the one hand the structure of the infinitesimally minute atom and on the other hand the limitless spaces of the universe.

Now sun-light whichever way it is to be used whether by plant or animal is subject to great variations in intensity. And so nature in the course of evolution has developed both in plant and animal a protective mechanism against excess light. The delicate chlorophyl granules lie in the palisade cells of the leaf. These are long columnar cells situated immediately beneath the surface epidermis. When the light intensity is feeble, the granules move to the surface of the cells in order to absorb as much light energy as possible. When the light intensity is excessive, the granules move towards the sides of the cells. They are thereby shielded from direct exposure to the excessive light energy. In the eyes of man we have a similar mechanism in the movement of the pigment granules of the pigment epithelium in the retina. On exposure to light the pigment granules move forward and pass between the rods and cones, so as to completely envelope them. On removal of the light the pigment granules withdraw and are massed largely at the junction of the rod and cone layer with the pigment epithelial cells.

However protection against excess light by the movement of pigment granules which seems adequate enough for the plant seems to have proved inadequate for the human eye. And so we see the development of other mechanisms for the protection of the eye. This includes the development of a diaphragm, the iris diaphragm, essentially a pigmented membrane serving as the framework for a pair of antagonistic muscles. The two iris muscles provide an additional and a very delicate mechanism for adapting the eye to various light intensities.

But modern man has outstripped nature in the rapidity of his rise to "civilized" conditions of life. Even the additional protection afforded by the iris diaphragm against excess light seems inadequate. A great many sufferers from "eye strain" owe at least part of their discomfort to this inability to cope with an ever increasing volume of brilliant, dazzling

light sources and glittering, highly polished reflecting surfaces. Their naturally developed protective mechanism against excess light is inadequate to afford sufficient protection. And so to supplement nature's devices for protection, we must resort to the use of lenses which absorb and tone down some of the excess light energy. Lenses with a neutral tint which have only a quantitative effect and no qualitative effect come nearest to nature's own method in providing protection for the delicate chlorophyl granules. There too the movement of the granules to the sides of the palisade cells lessens the light intensity uniformly without eliminating any of the natural constituents of the incident light. A similar protection seems, in general, best suited to the human eye.

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VISUAL ACUITY

In a special study of visual acuity made by Lythgoe, Corkill and Pearson[1], they find that the acuity of the eye for estimating the continuity of short straight lines such as vernier scales is many times higher than it is for the resolution of two dots. Up to a test-object brightness of about 12 foot candles, visual acuity is directly proportional to the logarithm of the illumination and continues to improve up to and probably beyond 1,275 foot candles. This disproves the old view that visual acuity is at its maximum at three to four foot candles. Visual acuity varies with the brightness of the surrounds of the test object, increasing until the surrounds are from one one-hundredth to one-tenth as bright as the test object. Beyond that point visual acuity shows a falling off. The effect of glare was investigated and they discovered that the factors found to influence the relation between visual acuity and illumination are (*a*) definition of the end point, (*b*) the degree of illumination of the surrounds, (*c*) the duration of exposure of the test object, (*d*) the use of artificial pupils, and (*e*) the correction of the brightness of the retinal image for pupil area.

[1]The Measurement of Visual Acuity. R. J. Lythgoe, D. E. Corkill and E. S. Pearson. Medical Research Council, Special Report Series, No. 173. England, 1932.

Their investigation has been made as part of the work done by the Committee upon the Physiology of Vision of the Medical Research Council of England. They come to some interesting conclusions, some of which, however, have not as yet been corroborated. C. C. K.

* * * * *

THE USE OF SELECTED PORTIONS OF THE VISIBLE SPECTRUM IN THE TREATMENT OF OCULAR ABNORMALITIES

Spitler and some of his associates have been experimenting with the controlled use of certain portions of the visible spectrum on various cases of ocular abnormalities. Using a lamp with a fixed and known source of illumination, the radiations of which are passed through especially made color filters, they have succeeded in obtaining some satisfactory results in certain types of cases, nine reports of which were presented before the American Academy of Optometry at Chicago last December.

The cases reported by Spitler[1] were two cases of amblyopia ex amopsia, three cases of headaches and vertigo, two cases of cataract, one case of progressive myopia and one case of a severe contraction of the color fields accompanied by a marked reduction of vision. All of these cases were successfully relieved of their symptoms by means of the controlled and concentrated application of various bands of the visible spectrum into the eyes of these patients for given periods of time at stated treatment intervals.

These are the first really successful case reports ever presented to the profession on the use of spectroband for ocular disorders. It is interesting to note also that two other papers dealing with the biological effect of radiant energy were also presented before the Academy at the same session. In the first by Sheard[2], the statement was made that the visible portion of the spectrum has no particular biological reaction and in the second paper, presented by the writer[3], who found, in a series of experiments very little benefit in the use of this therapy, except possibly in a few cases of pseudo-myopia and in a small number of cases of large amounts of esophoria.

However, despite the somewhat discouraging statements of Sheard and the writer in their individual reports, it must be remembered, first, that this is a new form of therapeutical endeavor with obviously many avenues of approach, and many of them wrong. Second, it must be remembered that Sheard was merely expressing the general belief among physicists in this matter and not giving the express results of any

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[1]Spitler, H. R. Vol. VII. American Academy of Optometry. pp. 154-156. 1933.

[2]Sheard, C. Vol. VII. American Academy of Optometry. pp. 132-133. 1933.

[3]Koch, C. C. Vol. VII. American Academy of Optometry. pp. 22-48, 1933.

particular *ocular* research on his part, and third, that the experimental work, the results of which were presented by the writer, was not carried out with the particular refinement which characterized the work of Spitler as the lamp the writer used in his experiments had a variable and uncontrolled source of illumination and his filters permitted a much wider band of visible radiations to reach the eye than did those of Spitler.

This is a new treatment field. Whatever progress will be made, will be made slowly. Many will attempt work and fail, but by careful planning and honest painstaking attention to detail something of value to optometry may result. Spitler and his associates are blazing a trail which may lead to marked changes in our methods of handling many of our problem cases. C. C. K.

* * * * *

GLAUCOMA

Debilitating illness, financial worries and the fatigue caused by the close attention to a sick relative are the predisposing causes that, according to Davies[1] should lead the refractionist to keep chronic glaucoma in mind. Davies also stresses the need for an early diagnosis in cases of glaucoma, for as is well known it is only by means of an early diagnosis that vision can be saved in these cases.

Among the characteristic symptoms of this disease in its early stages are the annoying difficulties encountered in reading which in turn demand frequent changes in the refractive correction. The patient complains of a transient dimness of vision and a weariness on attempting to read. An examination discloses a contraction of the visual field, a slight haziness of the cornea and a slight dilation of the pupil. At times there is also an abnormal fundus picture, although these retinal symptoms may not be present in the early incipiency of the disease. The entire matter is a most serious one for the future well-being of the patient and at the first suspicion of a symptom of this disease a competent ophthalmic surgeon must be called in consultation. C. C. K.

* * * * *

THE ETIOLOGY OF THE TERM "ORTHOPTIC TREATMENT"

At a recent meeting of optometrists a discussion arose as to the origin of the term "orthoptic treatment." Just where, and by whom the term was first applied to the technics of treating ocular muscular involvements. Some contended that the term was quite new, being introduced to the profession by contemporary American optometric writers. Others, while willing to admit that the term was new, believed, however, that the term was first used by British writers while still another group be-

[1]Davies, D. L. Chronic Glaucoma. Lancet. April 7, p. 699. —28.

lieved that the term had been in use for a considerable period of time.

The writer was then asked to settle the dispute. Being away from my office, with no library at hand, I was, of course, in no position to offer proof of my decision, which was to the effect that the term was by no means a new one. In fact, I stated, that, in my opinion, the term was in use in the latter portion of the nineteenth century. This statement, however, I could not, at the time, prove.

Later, in making a careful search of the writings of many of the illustrious men of two, three or four decades ago, I found the following quotation:

> "We have already twice mentioned the tendency that most patients manifest to fuse the double images as soon as these are brought near enough together. This is the reason why the degree of strabismus determined by the correcting prism is generally less than that which results from the diplopia. The treatment of strabismus which may be called *orthoptic* (the italics are his) is founded upon this observation. By some means, whether with the help of a prism or simply by means of rotation of the head, the two images are brought so near together that they may be fused. Then an attempt is made to maintain the fusion under less favorable circumstances. This is done either by diminishing the strength of the prism or by turning the patient's head slowly in the direction opposite to the strabismus, while he still tries to maintain fusion. In this way, the contraction of the paretic muscle is stimulated. It is true that in complete paralysis this device is unlikely to be successful."

In this manner does Edmund Landolt[1] mention the non-operative treatment of squint and in this manner does he use the term, "orthoptic" in connection with this treatment work. As far as I can determine, this was written by him, in or around the year 1890. In my ocular library of some 500 volumes, this is the earliest reference I could find of the term orthoptic treatment. This may not, to be sure, be the first use of this term, but it certainly shows that the term was not created by any of the well known contemporary optometric writers. C. C. K.

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LATENT HYPEROPIA

It is an accepted fact that the longer a considerable hyperopic error has been held latent, the more difficult it is to make it manifest and amenable to correction. This is particularly true in office workers between the ages of 25 and 40 and these cases are the ones which frequently present problems which require many months of patient work to successfully solve. However, as the condition is abnormal and acquired it can,

[1]Edmund Landolt, M.D. Anomalies of the Motor Apparatus of the Eyes. Translated by C. M. Culver. Vol. IV. Diseases of the Eye. Norris and Oliver. Lippincott. Philadelphia. 1900.

by means of care and individual observation of each case, be in time corrected. Turville[1] claims that latent hyperopia is the condition which results from the natural and unconscious desire for clear vision when the original formation of the eyes makes clear vision impossible without some departure from normal nervous and muscular activity. It is the result of a process of adaptation to a malformation, the latter being a condition in which the eye is too short to permit parallel rays to focus properly upon the retina. The total amount of malformation is termed "hyperopia," and is an original condition. The expression "latent hyperopia" is used to describe the proportion of the total original condition which has undergone unnatural correction by nervous and muscular effort in such a manner that it has become fixed, or buried, in an adapted reformation of the internal mechanism mainly comprising the ciliary muscle and the lens. The optical components of the eye have suffered an alteration in condition and shape, and held there without permission of relaxation, or return, to the original natural state. Suitable treatments and corrections serve, in time, to permit this needed relaxation and thus return to a more normal condition the neuro-muscular balance which has been upset. It is important, however, to keep in mind the fact that as a rule this work cannot be hurried. C. C. K.

BOOK NOTICES

THE PRINCIPLES OF PSYCHOPHYSIOLOGY, being a survey of modern scientific psychology. By the late Leonard T. Troland, S.B., A.M., Ph.D. Volume I—The Problems of Psychology and Perception, 1929, pp. 429. Volume II—Sensation, 1930, pp. 397, and Volume III—Cerebration and Action, 1932, pp. 446. Published by D. Van Nostrand Company, 250 Fourth Avenue, New York City. Price per volume, $3.50.

Some of us knew the late Dr. Troland quite intimately, enjoyed visiting with him in his laboratories in Harvard University (since he was for a number of years assistant professor of psychology in that institution of learning) and were always charmed by his clearness of thought and conciseness of diction as he addressed us on occasion at the Optical Society of America, The New England Congress of Optometry and the Academy of Ophthalmology. It came as a shock to his intimate friends and associates and "to the scientific world at large where he shone as a star of the first magnitude" that he had met an accidental death in California a little over a year ago. Born in Connecticut in 1889, graduated at Massachusetts Institute of Technology in 1912, a student of psychology under Muensterberg (thus obtaining an A.M. and Ph.D. from Harvard), with the General Electric Company and then as a member of the instructional

[1]Turville, A. E. The Common Complaint. The Dioptric Review. April, 1933. pp. 78-79.

force of Harvard, Troland devoted his life to research and to the authorship of books. He was a prodigious and indefatigable worker and had a grasp of physics, chemistry, biology and psychology that is given to but few men. He was ever vitally interested in the problems of "the relationship of consciousness and the physical world." So, while he has passed on to that "mysterious realm" he has left us with the written products of a master mind.

Some few months ago I was the recipient of the three volumes which constitute the *magnum opus* of Troland, dealing with the problems of psychophysiology. Since the receipt of them, I have been spending many hours reading, rereading and "digesting" these scholarly books, written in a diction that is very understandable, clear and instructive. To adequately review such a set of books would be impossible within the confines of an issue of this magazine. I shall attempt in the succeeding paragraphs to give some idea of the scope of this monumental work. Incidentally, there was to have been a fourth volume entitled "The Ultimate Theory of Mind and Matter" but I believe I am correctly informed that this volume was not completed at the time of the author's death.

Volume I—*The Problems of Psychology and Perception.* Following a 56-page outline of the history of psychology, the volume is devoted to the concepts of psychophysiology, experience and response, component perceptions and composite perceptions.

Volume II—*Sensation.* The concept of sensation, visual sensation (over 150 pages devoted to this topic), chemical senses, cutaneous senses, kinasthetic and internal sensation.

Volume III—*Cerebration and Action.* This volume deals with the psychophysiological problem of cerebration, configurations, special experimental patterns, application and control of cortical adjustment: the problem of action, types of action and the psychophysiology of motivation.

The three volumes contain a total of 140 illustrations and a bibliography comprising 957 references.

It is, indeed, a masterpiece of work from a master hand. I believe that it deserves a place beside such volumes as those of Helmholtz' Physiological Optics. To those who are scientifically interested in the relationships of consciousness and the physical world as attained through the special senses—and in particular vision—these volumes will prove to be a veritable mine of information and suggestion. These volumes are to be unreservedly recommended to the student element of the profession —whether in the class room or in the practitioner's office.

Charles Sheard.

CLINICAL PHYSIOLOGY OF THE EYE, by Francis Heed Adler, published by the Macmillan Company, 60 Fifth Avenue, New York, N. Y. 406 pages. 92 illustrations. Cloth cover. 1933. Price $5.00.

Clinical Physiology of the Eye was written by Dr. Adler to fill a need felt by most students and practitioners of the eye. We believe this to be the first and only book in the English language devoted exclusively to the physiology of the eye. Adler set out to furnish a complete reference book on all the different subjects related to the eye and the reviewer feels that he accomplished this task well.

In the first three chapters he describes the structural anatomical parts which play an important part in the ocular physiology. Particular attention is paid to the neurological aspect involved in the ocular function. In the fourth chapter he describes the lens and the vitreous, the structure, chemistry and metabolism involved. The fifth chapter is devoted to a complete discussion of visual acuity pointing out the parts played by the physical and psychological factors and in the sixth chapter the visual pathways and visual fields are described in the most thorough manner.

The objective changes in the retina and the subjective characteristic of vision are dealt with in the seventh and the eighth chapters. The next three chapters are given over to a discussion of binocular vision, entoptic phenomena and the optic nerve.

A most complete description about the external ocular muscles, their joint action and the nerve centers and pathways controlling the complex ocular movements is to be found in the twelfth chapter. The last two chapters are devoted to the physical and chemical properties of the normal aqueous humor, its formation, eliminiation and circulation and to the intra-ocular pressure its normal maintenance as well as to hypertension and hypotension. To the reviewer the most important part of the book is the very large list of text references and exhaustive bibliographies given at the end of each chapter. This enables the reader to find all of the original important published material available on the subject without wasting much time and effort. Each student and practitioner who takes the study of the eye seriously will do well to add a copy of Clinical Physiology of the Eye to his library. J. I. K.

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THE VISUAL FATIGUE OF MOTION PICTURES. Edited by Aaron E. Singer. Published by the Amusement Age. 48 pages. Paper Covers. $1.00, 1933.

This work consists of a series of brief statements by various people dealing with the subjects of lighting, the eye, projection, education, ventilation, exhibitor, architecture, seating, posture and the screen as applied to the motion picture industry.

Just what is back of it all is a bit difficult to understand. In the Summary and Recommendations we find to our surprise the statement that "to sit through three hours of movies is an ordeal for a normal pair of eyes—" This statement is incorrect. There is no more visual fatigue engendered in watching the average movie than there is in doing other every-day tasks. To be sure, most pictures today seem so poor, that it IS difficult to sit through them, but that certainly is not the fault of the projection device but is rather the fault of the story or plot.

We also find the rather breath-taking statement or suggestion that movie goers, each time they buy a ticket at the theatre, have their eyes examined by the theatre oculist, thus permitting that learned (?) refractionist to determine just where they should sit in the theatre so as to do the least possible harm to their eyes. We might also add to this that in his spare moments while examining the eyes of several thousand individuals each day he might also take in the tickets and play the French Horn in the now non-existant orchestra. C. C. K.

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LIFE-GIVING LIGHT[1]. Charles Sheard, Ph.D., Sc.D. Published by the Williams and Wilkins Company, Baltimore, Md. 174 pages. Illustrated. $1.00. Cloth. 1933.

The scientist writes for laymen. Sheard in this volume dealing with radiant energy, outlines in a readily understandable way the essential known facts and the more generally believed theories regarding light and its relationship to life.

Without omitting any of the essentials, Sheard has handled this largely taken for granted subject, in such a way as to infuse it with real life, and in so doing has produced a book of real interest to any adult. For the optometrist, much which is included is indeed already known, however, it is so refreshingly put together by this "optometrical master" that all practitioners can gain much by an evening spent in the company of this gracious little work. C. C. K.

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[1]From the Century of Progress Series each dealing with one of the Sciences. The books are $1 each and are as follows: Biophysics, *Life-Giving Light*, by Sheard; Ecology, *Animal Life and Social Growth*, by Allee; Astronomy, *The Universe Unfolding*, by Baker; Mathematics, *The Queen of Sciences*, by Bell; Bacteriology, *Man and Microbes*, by Bayne-Jones; Evolution, *Evolution, Yesterday and Today*, by Newman; Chemistry, *Chemistry Triumphant*, by Hale; Geology, *The Story of a Billion Years*, by Hotchkiss; Physics, *Time, Space and Atoms*, by Cox, Aviation, *Flying*, by Fechet; Communication, *Telling the World*, by Squier; Electrochemistry, *Sparks from the Electrode*, by Mantell; Petroleum, *Earth Oil*, by Egloff; Psychology, *Adjustment and Mastery*, by Woodworth; Metallurgical Sciences, *Our Mineral Civilization*, by Read; Automotive Engineering, *The New Necessity*, by Kettering, and Entomology, *Insects—Man's Chief Competitors*, by Flint.

ANNOTATIONS
AND
SOCIETY PROCEEDINGS

The American Journal of Optometry is the Official Organ of the American Academy of Optometry, as well as the Organ of the Arkansas, Delaware, Indiana, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Dakota, Vermont and West Virginia Optometric Associations.

The following gentlemen have consented to supply items of interest from their respective sections, acting in the capacity of

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A. O. A. NATIONAL MEETING

The Thirty-sixth Annual meeting of the American Optometric Association was held at Chicago, Ill., during the first week of July. At this annual meeting all of the officers were re-elected with the exception of one trustee, Dr. Esther Ingram of Winterhaven, Fla., who now holds the position formerly occupied by Dr. J. Fred Andrae of Baltimore, Md. The re-elected officers are: President, Dr. Thomas McBurnie, Brooklyn, N. Y.; First Vice President, Dr. E. B. Alexander, Duncan, Okla.; Second Vice President, Dr. Walter I. Brown, New Bedford, Mass.; Treasurer, Dr. Frederick A. Stengel, Marion, Ohio; Trustees, Dr. Walter F. Kimball, St. Joseph, Mo., and Dr. Louis Jaques, Los Angeles, Calif.; Secretary, Dr. Ernest Kiekenapp, Faribault, Minn.; and Attorney, the Hon. Julius S. Berg, of New York City.

During convention week the mornings were given over to talks and lecturers. One of the first speakers before the convention was Mr. M. J. Julian, who explained fully the work of the Better Vision Institute, of which he is the head. The Institute has been adopted by the optometric profession and the optical industry as the clearing house for the problems mutual to both and also acts to advance the interests of both groups. In addition to this, it will also serve as a focal point in the arrangements of various codes now being worked out by the various elements of the profession and trade.

The next speaker was Dr. Carl Shepard of the Northern Illinois College of Optometry. Dr. Shepard spoke on the Effort Distribution During Binocular Seeing. This talk was very well received.

The next speaker was Mr. Ralph Barstow. His topic was "Build-

ing Professional Practice." Mr. Barstow is well known to the optometric profession as a writer on Economic subjects.

Following Mr. Barstow, Dr. Louis Jaques, of Los Angeles, spoke on the diagnostic procedure of taking the Blur Points and their interpretations.

The next speaker was Dr. Ewing Adams, of Michigan, who spoke on the Advancement of Organization Work in Optometric Societies.

The last speaker to address the convention was Dr. William Feinbloom, of Brooklyn, N. Y. Dr. Feinbloom's subject was the correction of sub-normal vision by means of the New Telescopic Spectacle and also the Contact Lens. Dr. Feinbloom not only presented the technics of each of these interesting refractive procedures, but also presented a film showing each step in great detail. His talks were very well attended and much interest was aroused in these subjects.

July 4th was given over to the delegates to view the Century of Progress, and the evening of Wednesday, July 5th, was spent taking a moonlight trip on Lake Michigan on the Steamship Theodore Roosevelt.

The Optometric Exhibit Hall at the Convention was very interesting. These displays were placed on the same floor on which the business sessions of the A. O. A. were held, at the Palmer House, and drew large crowds. Several new instruments were on display for the first time, these being as follows:

The Stereo Orthoptor, presented by Dr. Julius Neumueller and Dr. Roy S. Dean, for the American Optical Co. This is a device used in the treatment of squint, to develop the fusion faculty. The American Optical Co. also presented a new Projection Chart recently invented by Dr. Wheelock, an Iowa optometrist.

Bausch and Lomb featured their new Hydraulic Refracting Unit containing an Office Chair, also a Hydraulic Instrument Stand with built-in Low Voltage for the various hand instruments.

The Cameron Surgical Instrument Co. featured the Cameron-Spitler Amblyo-Syntonizer. This is a lamp built to use the visible portion of the spectrum for optometric therapeutic uses. Dr. H. Riley Spitler, of Eaton, Ohio, is the inventor of the instrument and also the "spectro-band" technic with which it is used.

The Wattring Normalizer was presented by the Riggs Optical Co. This is a treatment device somewhat like the Arneson Squint Korrector and used for the same purpose.

The Shuron Optical Co. had a very interesting booth in which was featured the Parallax, a new refractive attachment invented by Dr. F. McFadden, of Rutland, Vt. This attachment fits on the Genothalmic Refractor and is a great aid in refractive work.

Numerous other exhibitors were there, but the above notes cover the newer treatment devices and refractive instruments that were shown. Optical material of all kinds was of course on display.

During the sessions of the A. O. A. the Women's Auxiliary also met, at what is said to have been one of the finest meetings this organization has ever had. The International Association of State Boards of Optometry also had its annual meeting, and the Fellows of the Academy who were in Chicago for the Convention met for their usual breakfast. Several optometric fraternities held special meetings, as did the Illinois Society. Toronto, Ontario, was chosen as the meeting place for 1934.

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REGULATIONS IN UTAH

A new series of Optometrical regulations have been adopted by the State Board of Optometric Examiners for the State of Utah. These regulations cover all phases of both the professional and business sides of optometric work and are published in booklet form. Persons wishing a copy of these regulations should write to Dr. M. H. Dearden, Clift Building, Salt Lake City, Utah.

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FLORIDA ANNUAL CONVENTION

At the Annual Convention of the Florida State Association of Optometrists the following were elected to office: Dr. F. M. Hadley, President; Dr. Ester M. Ingram, First Vice President; Dr. T. Moore, Second Vice President; Dr. J. M. Morqus, Third Vice President; and Dr. A. C. Haughton, Secretary. Miami was chosen for the meeting place for 1934.

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INDIANAPOLIS INSTITUTE OF OPTOMETRY

Optometrists met Friday night at a dinner at the Atheneaum to organize and elect officers for the Indianapolis Institute of Optometry. Plans were laid to promote publicity of an educational nature and committees, headed by Dr. Donnell Hadley, Dr. W. L. Van Osdal, Dr. D. D. Terrell and Dr. Paul Kernel were appointed. Dr. Emil Kernel was elected Chairman, and Dr. Roland E. Cox, Secretary-Treasurer. Future meetings will be held monthly at the Atheneaum.

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ARKANSAS OPTOMETRIC ASSOCIATION

Dr. F. I. Tibbetts, Dr. C. H. Brown, Dr. S. K. Lesser, Dr. C. G. Melton, Dr. E. N. Queen and Dr. J. J. Livingston were the speakers at the Twenty-seventh Annual Convention of the Arkansas Optometric Association held at the Albert Pike Hotel at Little Rock on the 23rd and 24th of June At this meeting Dr. B. M. Wilson was elected President; Dr. J. J. Livingston, Vice President, and Dr. H. L. Pumphrey, Secretary.

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ESSEX COUNTY SOCIETY

The Clinic Staff of the Free Optometric Clinic of the Essex County Optometric Society presented a series of papers on "Investigations in Convergence Anomalies" at a meeting on June 30th at Newark, N. J. Other similar papers will be presented in the near future.

NATIONAL RESEARCH COUNCIL

The National Research Council, Division of Anthropology and Psychology, has appointed Robert H. Peckham, Ph.D., as Research Fellow at the University of Pennsylvania for the academic year 1933-34, to continue in the investigations of eye movements and monocular suppression with which he has been occupied at Johns Hopkins University for the past two years. One of the problems specified for attack is that of strabismus, with the particular attention directed toward an attempt to determine whether or not a diagnostic method may be discovered through which it may be known if a squinting eye may be expected to be straightened by exercising.

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INDIANA MID-SUMMER CONVENTION

The Annual Mid-Summer Meeting of the Indiana State Association of Optometrists was held at Terre Haute. The two-day sessions were largely informal, being devoted to summer pleasures such as boating on the Wabash River, dancing and golf.

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DOCTOR DUDLEY L. TICE

Pennsylvania optometrists feel that they have suffered a deep loss in the passing of Dr. Dudley L. Tice. After an illness of two weeks he died of heart disease Thursday, July 6, at his home, 6138 Ludlow Street, Philadelphia.

For many years an outstanding figure in his profession, Dr. Tice was especially concerned with anything having reference to the educational features of optometry. He was always found at lectures delivered in his home city or in its vicinity and on such occasions invariably took copious notes. As recently as last fall, in his seventy-fifth year, even though he was not in good health, he drove fifty miles to Allentown to attend a lecture by Dr. Louis Jaques, of Los Angeles.

Because of his interest in the advancement of his profession, Dr. Tice was among the first supporters of the Pennsylvania State College of Optometry and was a member of the board of trustees from its inception. He was the first vice president of the board and was chairman of the faculty committee.

The deceased was president of the Philadelphia County Optometric Association for three years and on his retirement was presented with a valuable watch and chain. He was also a member of the state and national associations.

Dr. Tice was born in West Lynn, Mass., in 1859. While a young man he moved to Reading, Pa., and there married Miss Florence Rettew, deceased. Two daughters, Dr. Sarah R. Tice, 6138 Ludlow Street, and Mrs. Hazel Wigner, 2234 North Twenty-ninth Street, survive. After a few years Dr. Tice moved to Philadelphia, where he achieved high reputation among the optometrists of his adopted city.

Becoming affiliated with the Odd Fellows while a young man, Dr. Tice was a past grand of Apollo Lodge No. 296 and a member of Har-

rison Encampment. For twenty-one years he was the representative of the Grand Lodge to the Rebecca Home in Philadelphia. In March, 1930, he was presented with the fifty-year jewel. He was a member of Thomas R. Tatton Lodge, F. and A. M.

The funeral was Monday morning, July 10, and the interment in Laurel Hill Cemetery.

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"CONTACT LENSES" BY FEINBLOOM

We have received a number of requests for back copies of the *American Journal of Optometry* which contain the 18,000-word paper on Contact Lenses by Dr. Wm. Feinbloom, optometrist, of Brooklyn, N. Y. This is now out of print and we are unable to supply the issue.

We may, however, have this material reset and reprinted, and will do so if a sufficient number of optometrists wish us to do so.

The work is fully illustrated and will run at least 36 pages, plus cover.

Feinbloom in this paper fully outlines the procedure to be followed in prescribing Contact Lenses and also gives a number of case reports, which in themselves are of great value.

Optometrists wishing a reprint of this paper by Feinbloom on *Contact Lenses* are requested to mail $1 to the *American Journal of Optometry*, 1501-1504 Foshay Tower, Minneapolis, Minn., at once. If a sufficient number of orders are received to warrant resetting and reprinting the article, we shall do so within the next three weeks. If not, your dollar will be returned.

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"TELESCOPIC SPECTACLES" BY FEINBLOOM

The paper covered monograph on *"Telescopic Spectacles and the New Sub-normal Vision Lens"* by Dr. William Feinbloom, optometrist, of Brooklyn, N. Y., which was published by this Journal in March of this year, is now nearly sold out. Less than 100 copies of this work remain on hand from the original printing.

Optometrists wishing a copy of this 48-page paper covered reprint of Feinbloom's various works on the Telescopic Spectacle and the Subnormal Vision Lens, should order their copy at once, as no further reprintings are contemplated. The cost is $1. Orders should be sent to the *American Journal of Optometry*, 1501-1504 Foshay Tower, Minneapolis, Minn.

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OCULAR-PSYCHOMETRY BY SHEPARD AND MENDELSOHN

We receive, from time to time, orders for the 66-page paper covered monograph on *Ocular-Psychometry* by Shepard and Mendelsohn, which was published by this Journal in 1929. We regret that the entire edition is now sold out and no orders for this work can be filled.

PHILADELPHIA COUNTY SOCIETY

President Denny W. Jones of the Philadelphia County Optometric Society, has been re-elected to that position and now is serving his third term. Dr. John D. Shoptaugh was elected vice president. Dr. John C. Neill and Dr. F. W. Haussmann were re-elected, respectively, as secretary and financial secretary, each now serving his fifth term. Dr. Frank A. Blence was elected treasurer.

The board of trustees is as follows: Dr. J. F. Neill, chairman; Dr. Albert Fitch, Dr. T. R. Simpson, Dr. Lester Miller, Dr. Joseph J. Hanna, Dr. Samuel H. Hostetter and Dr. Michael Curcio. The society meets monthly in the Clinic Building of the Pennsylvania State College of Optometry at Eighteenth and Spring Garden streets.

An extensive educational program is being planned for the coming year and several study groups are being arranged. Dr. Michael Curcio will give a laboratory course in ocular histology and histo-pathology. Dr. Wilson S. Hankins will continue his group study course in clinical laboratory diagnosis.

Under the direction of Dr. George A. MacElree, Jr., an advanced group will consider critically the various systems of ocular examinations and diagnosis now being taught and used throughout the country, relating them to the fundamental sciences and to clinical experience.

In addition, the staff of the Pennsylvania State College of Optometry research department of Physiological Optics will report through the year, on the results of their investigations.

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PENNSYLVANIA STATE COLLEGE

The plan of organizing regional groups of the Alumni of the Pennsylvania State College of Optometry is being worked out by the new officers and will probably be fully developed in the near future. The proposition of having an Alumni Week instead of an Alumni Day proved to be so profitable as well as enjoyable that there was no hesitation in deciding to have Alumni Week in 1934.

The old graduates were enthusiastic in their praise of the wonderful new development and of the opportunities offered the students now as compared with the facilities granted them when they were undergrads. Some of them lived in the dormitories and took advantage of the swimming pool and athletic field.

From the professional improvement viewpoint the week was found to be unusually profitable. Considerable experimental work has been completed in the past year. Dr. John Morrow and the clinic staff have conducted a series of experiments dealing with the changes in the radii of the cornea under different conditions of fixation. Other members of the department of Optometry under direction of Dr. Edwin F. Tait have carried through investigative problems on accommodative convergence relationships, cyclophoria at distance and near and the quantitative effect of homatropine on the tonus of the ciliary muscle. Results of this work were reported.

Who Remembers